Signify Research

WHITE PAPER

Managing unstructured clinical content

A roadmap for health providers to adopt clinical archives that augment multi-disciplinary care

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Introduction

Healthcare providers today are struggling to cope with managing the scale and diversity of data generated as healthcare networks grow. Clinical content, which includes medical images, unstructured clinical notes, clinical device data, visible light images, audio recordings, and external charts and records, is often unavailable to central administration and operational IT systems such as electronic medical records (EMRs). Many key stakeholders in clinical and operational functions need to access, manage and exchange this information, but too often these needs have been overlooked or underserved. IT administrators have also become paralyzed by the growing volume of legacy applications and unstructured content in their organizations. These data silos have only become more problematic as health systems have consolidated and grown. Clinical content integration is therefore one of the biggest challenges facing health informaticists today. It is also fundamental to improving care standards, especially as providers look to offer more integrated, personalized care for their patients.

The challenge posed by unstructured clinical content

Digital transformation has spread across clinical and operational systems at different rates, creating a complex patchwork of new and older applications. Most efforts in healthcare digitalization have focused on core financial, operational and basic patient records. Outside of these systems,

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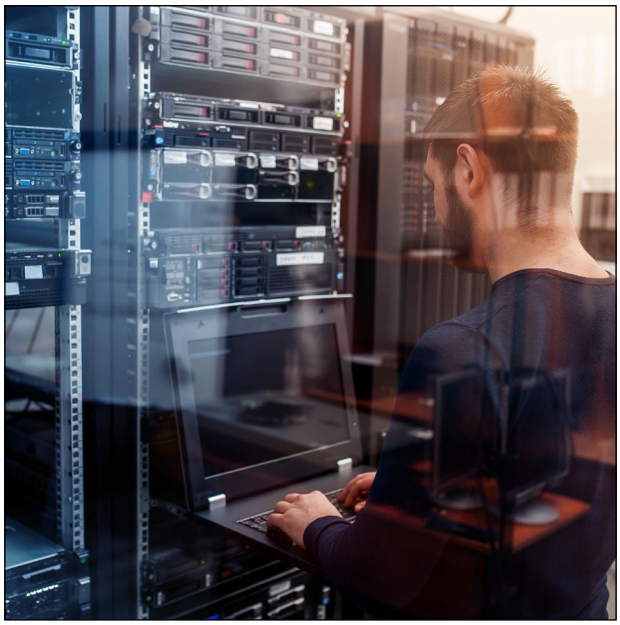
Figure 1 Summary of market environment and challenges facing healthcare providers today

MARKET ENVIRONMENT TODAY	CHALLENGES
Changing models of healthcare provision to holistic, integrated and personalized care	Need for access, management and exchange of clinical content across a diverse set healthcare stakeholders
Growth in cyberattacks targeting healthcare providers and patient data	Patchwork of siloed and unsupported legacy clinical applications challenging to keep secure against new threats
Increased size of healthcare provider networks due to consolidation and regional clustering	Rapid proliferation of access and exchange requests across healthcare networks
Few harmonized data standards across clinical and enterprise software	Higher spending on custom application programme interfaces (APIs) between different software
Exponential increase in volume of healthcare data generated in clinical segments	Growing pressure on IT infrastructure and long-term cost planning for clinical informatics

siloed and fragmented management practices for unstructured clinical content are still common, due to the unique needs of each application and clinical user group. Unmanaged, this diverse and complex environment becomes not only a recipe for errors and inefficient care, but also a significant security risk. Cyberattacks on healthcare providers and concern from patients over their health data privacy and security have increased significantly in recent years.

At the same time, the scale of healthcare networks has grown, often due to health provider mergers or regional health system consolidation. Demand for access to data has therefore also increased, with incoming and outgoing information exchange requests proliferating from a diverse ecosystem of allied providers, payers and patients.

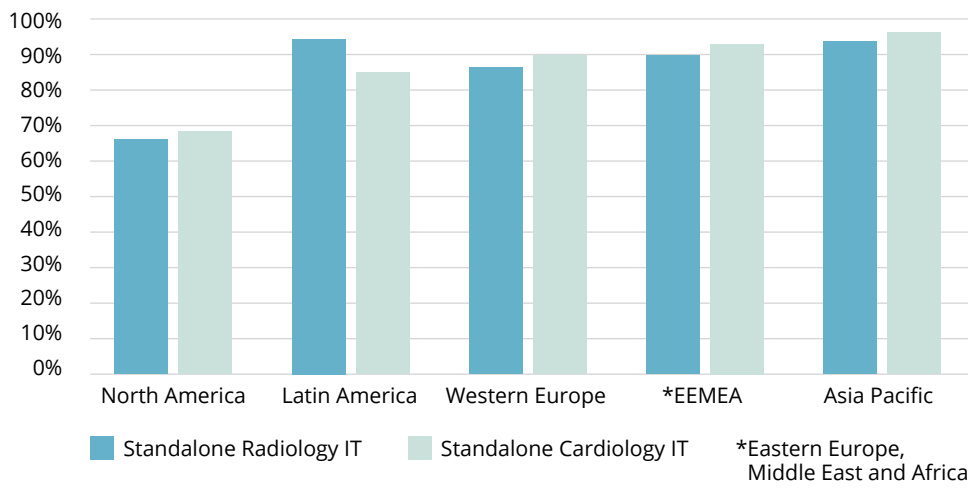


Care delivery has also markedly changed. Health legislators and physicians are today pushing for care transformation, moving towards holistic, integrated and personalized care. This is exemplified in the increasingly common establishment of multi-disciplinary care teams, such as "tumor boards" for cancer care. Yet, interoperability of health data and robust standards development remain woefully behind the pace of healthcare digitalization. Proprietary formats, limited standards and customized interfacing are still the norm today. Newly formed multi-disciplinary care teams are therefore struggling to access the validated and clinically consistent patient data they need from across healthcare provider networks.

Towards mature enterprise clinical content management

Health IT administrators are thus facing a perfect storm in terms of clinical content and medical image management. Many providers and legislators believed EMR systems and Health Information Exchange (HIE) solutions would be the golden arrow to solve these challenges. However, EMR and HIE have had limited success in addressing the myriad of nuanced applications and unstructured content outside of core administrative patient records and financial billing processes. Providers have therefore been left with little option but to spend large tracts

Figure 2 World market for imaging IT 2017 – standalone as a percentage of total market (2017)



"Standalone" software and services for clinical and diagnostic use in radiology and cardiology (not bundled or offered as an enterprise platform) still make up the majority of revenue spent on informatics in all major global markets. This continues to create data siloes and limits clinical data interoperability and limits the flow of clinical content across healthcare enterprises.

of their informatics budget on creating custom application programme interfaces (APIs) to deal with integration issues.

This has detracted budget and resources away from tackling the growing challenge of unstructured data integration and management, coupled with the complexity and cost of consolidation. Instead, many are in an ongoing cycle of reactionary measures, dealing with each data exchange or interoperability request as a standalone project. While this does have short-term benefits in enabling point-to-point exchange for the highest demand requests, it continues to avoid addressing broader interoperability. Without a more holistic approach to integrating structured and unstructured data, support for multi-disciplinary care and robust multi-node interoperability will not be achieved. Such is the complexity and magnitude of today's health systems. For many, it has become almost impossible to strategically roadmap future implementation and long-term plans to address all the needs of the system. This has created delays in new technology adoption, frustrated physicians and ultimately slowed provider evolution towards safer, high-quality integrated care.

Health providers facing these challenges must therefore shift their focus towards a staged approach to management and integration of structured and unstructured clinical content. While every provider has its own unique needs, a common blueprint for such a roadmap is described in the following sections.

Phase I

Defining return on investment (ROI) and identifying pain points

One of the biggest hurdles for healthcare leadership lies in fully understanding the complex flow of structured and unstructured content across their organizations. Harder still is understanding the needs of each user group and more importantly, where the biggest pain points exist for clinicians and operational staff.

To complete this first phase, it is vital for project leaders to identify and win support from key leadership stakeholders, especially the parts of the healthcare organization with the most to gain. Only with their support can clear goals and key performance indicators be established, especially as each clinical group has unique and varied clinical processes and operational protocols. While this can be a lengthy and political process, without understanding where unstructured content is in use and which stakeholders need access to the information, further progress will be difficult. Prioritization should start with applications and user groups that can return the highest ROI across clinical, operational and financial measures, to act as exemplars to the rest of the organization.

Once defined, the newly established "ledger" of applications and user nodes can also be the blueprint from which to establish a phased plan for consolidation of legacy applications and

It is vital for project leaders to identify and win support from key leadership stakeholders.

integration and will assist in defining the criteria for vendor partners to be assessed.

Phase II

Building a foundation – clinical archive adoption

One of the common mistakes made by healthcare organizations in tackling clinical content management issues has been a lack of focus on establishing a robust clinical archive early in the process. Many overlook, under-invest or attempt to extend the use of products, such as picture archiving and communication systems (PACS), that are not capable of handling a diverse range of clinical data and user needs across far-reaching healthcare enterprises. Therefore, it is important for health providers to carefully consider the selection of clinical archive solutions, especially as this will form an important foundation and long-term basis for future roadmap phases.

Suppliers should be able to offer a technically mature data registry and repository, with a clear record of past implementations handling both structured and unstructured clinical content at similar-sized health systems. Providers should also look for the following essential features while selecting a clinical archive solution:

- Capability to ingest and recall content in native format, agnostic to proprietary clinical data structures and sources
- Standards-based, supporting a wide range of IHE profiles
- Embedded image and content exchange capabilities
- Advanced data lifecycle management and disaster recovery
- Scalability and expandability
- Support for long-term ROI measurement

The benefits of selecting the right partner early are numerous. Above all, establishing a robust clinical archive creates a "source of truth" across the healthcare enterprise, allowing all structured and unstructured content to be managed in a single registry and repository. This phase should also be carried out without replacing front-end software or user interfaces, thereby limiting disruption on daily clinical workflow. At the same time, it will allow administrators a holistic view of network demands, making ongoing capacity planning and futureproofing more straightforward.

Phase III

Content enabling clinical practice

The next phase focuses on maximising the value of the newly established clinical archive to improve clinical and operational practices, especially the mechanics of clinical content access, viewing and exchange with current departmental systems. This will require ongoing dialogue with clinical and operational leaders, but should focus initially on areas identified as providing the greatest ROI for the organization. Many decisions will need to be made with the collective leadership of each clinical user group and could also lead to de-commissioning some legacy systems and applications over time. Key areas of focus for this phase should include:

- Establishing routine protocols for secure, authorized access, view and exchange of clinical content in each user group
- Deciding if a "universal viewer" will be used across clinical user groups, or if clinical content must be made available through existing departmental viewers. A hybrid approach might also be considered.
- Identifying legacy software or applications that will fail to meet current or future needs in terms of interoperability, security and clinical practice
- Selection of suitable clinical, operational and workflow modules to support multi-disciplinary use, either from the clinical archive partner or a third party
- Establishing a timeline for phasing out and decommissioning legacy system use

Each topic is nuanced and highly dependent on the unique needs of each health system, so it is challenging to generalize how each provider should address these areas specifically. However, bringing in additional solutions and/or decommissioning legacy applications should be evaluated against a robust set of criteria, ideally striking a balance between specific departmental needs and the broader enterprise strategy. These include:

- Ensuring availability of clinical content across the enterprise in a secure manner
- Not hindering the flow of clinical content between departments or create data silos
- Allowing selective and seamless integration with other enterprise systems (e.g. EMR, PACS, ERP)
- Enhancing the quality of patient care
- Allowing regular ROI measurement

If we take a specific use case, it becomes even clearer that ensuring these principles is essential.

Multi-disciplinary tumor boards (MDTs) are an increasingly common way to improve the

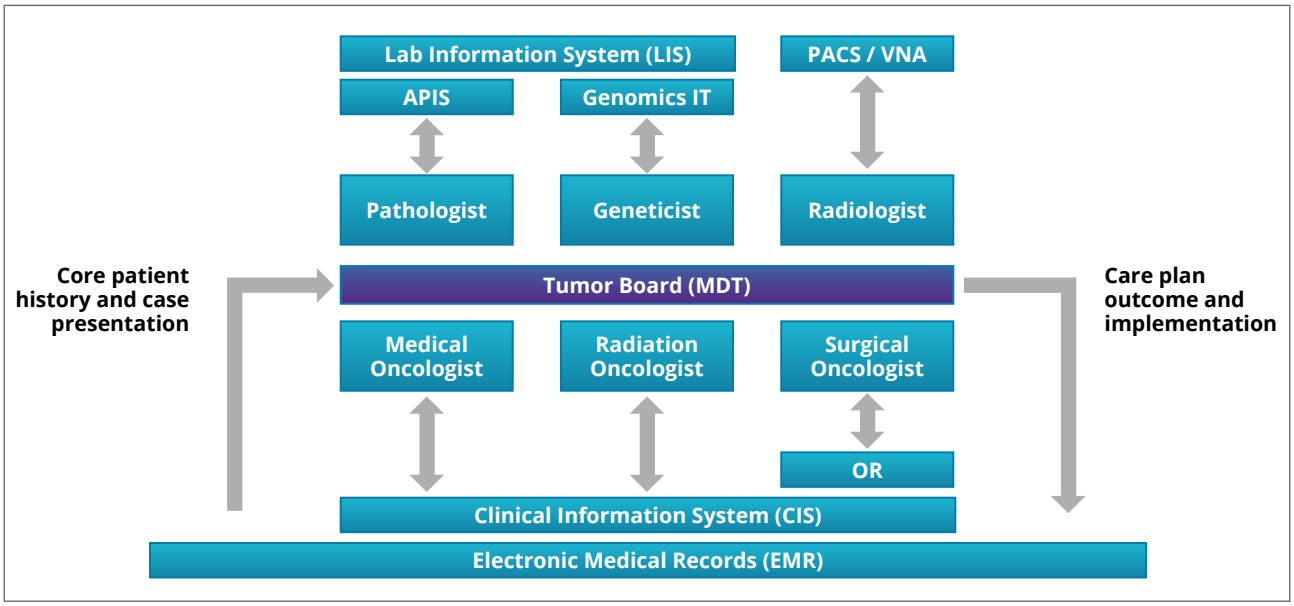


Figure 3 Structure and information flow for multidisciplinary tumor board (MDT)

diagnosis and treatment of cancer patients. They are made up of clinicians from a range of departments that are actively involved in cancer care — most prominently representatives from oncology, radiology, surgery, and pathology. In many healthcare provider organizations, the information this group requires is distributed across the EMR, PACS, Laboratory Information Management System (LIMS) and an array of speciality clinical applications. This has often resulted in administrative support people or clinicians spending many hours compiling the necessary content for review ahead of the meeting.

With a clinical archive spanning these functions, content is tagged and easily collated, saving significant time and resources and producing a clear ROI for the provider organization. Furthermore, if the information can be accessed and shared via a common user interface before, during and after the meeting (be it a universal viewer or integrated workflow toolset), clinical collaboration can also be significantly improved. Robust integration with the EMR and broader care coordination systems also means the treatment decisions of the MDT can be quickly implemented, as opposed to each clinical group needing to act within their own departmental systems. Thus, duplication of effort is reduced, access to care is more streamlined and overall quality of care is improved.

Phase IV

Analytics and process improvement

As organizations progress through their roadmaps for clinical content management, additional benefits for a consolidated clinical content platform will also become evident. Central monitoring of network demand can help administrators learn more about the workflow of their clinical teams and identify patterns of use that can be improved. This can be driven at multiple levels:

- Departmental: Implementation of analytics and tools to support care efficiency and quality, including quality audits, resource utilization, compliance, care outcomes and performance measurements.
- Multi-disciplinary: Monitoring routine workflows of established multi-disciplinary care teams (such as MDT, geriatric care, emergency medicine) and outcomes can act as exemplars for other clinical groups. Cross enterprise clinical content access and exchange can also help care teams design better care pathways for comorbidities as well as create opportunities for research collaboration between providers and academic institutions.
- Executive: A real-time dashboard of core operational and care outcome data can

Figure 4 Benefits of phased roadmap for Healthcare Provider Clinical Content Platform Implementation

I) Defining ROI and identify pain points	• Identifies highest priority areas to benefit from new implementation • Builds support from clinical leadership early in process • Ensures implementation contributes to improvements in financial, operational and clinical outcomes
II) Clinical Archive Adoption	• Creates a "source of truth" for all clinical content across the network • Limits disruption on frontline software applications during implementation • Provides holistic view of network demand to support capacity planning
III) Content Enabling Clinical Practice	• Targets implementation to highest priority clinical users based on ROI • Initial ROI case studies can be used as vanguards for wider organization • Establishes robust universal criteria for assessing viability of legacy and new clinical software and applications
IV) Analytics and Process Improvement	• Enables greater use of performance measurement across clinical, operational and executive levels of the organization • Leads to improvement in care standards clinical efficiency • Administrators can better understand network demand and use

provide timely, actionable metrics to inform and enhance the decision making of executive leaders, especially Chief Medical Information Officer (CMIO), Chief Nursing Officer (CNO) and Chief Information Officer (CIO).

It is clear then that the clinical archive can have a significant bearing on a healthcare provider's ability to evolve towards a more integrated, multi-disciplinary care team. Any platform selected should also be weighed against long-term priorities, as it must be able to adapt and meet the future needs of the healthcare provider organization as well as addressing the challenges of today.

Enterprise content platforms and a new paradigm of the vendor-provider relationship

While many providers have only just begun (or have yet to start) their journey towards clinical data consolidation, it is obvious that the demands of modern healthcare require a more expansive model for clinical content management. We believe that over time, the growing demands on clinical data management will lead to the establishment of a centralized hub within the healthcare provider organization.

The characteristics of such a platform will vary between providers, aligned with the specific and unique needs of each healthcare organization. Yet, some clear characteristics and core functions are universal. ACE platforms should offer a structured, content-agnostic, vendor-agnostic environment that interfaces and manages all diagnostic, clinical and operational content. User experience should be seamless, with a common user interface (UI)

across the different clinical user groups, especially when alternating between EMR administration and clinical/diagnostic use. However, it should also be flexible, enabling the availability of applications and tools that enhance care in speciality areas. There should also be no need to "rip and replace" the core systems; instead the ACE platform should grow and evolve over time as the needs of the provider and clinical user base change.

Agnostic Clinical Enterprise (ACE) platforms

An ACE platform is an enterprise IT platform that manages all structured and unstructured clinical content from all diagnostic and clinical departments across a health provider enterprise. It should augment the day-to-day operations of clinical and diagnostic users, enabling access, exchange, archive, query and structured archiving of clinical data. It should also include, or support, use of business intelligence and operational analytics tools and dashboarding.

ACE platforms should also seamlessly integrate and exchange clinical content to enrich other clinical department, administration and operational systems across the enterprise. ACE platforms should also offer a common interface for user access across the enterprise, or support seamless transition with other enterprise and specialist viewers.

Consequently, implementation of a long-term strategy towards establishing an ACE platform should also change the nature of the vendor-provider relationship. Central ACE platform vendors will increasingly become long-term partners to the healthcare provider, as well a contractor for additional integration of third-party applications, as no single vendor can provide all the needed functionality given the complexity of healthcare today. Such a partnership will also provide opportunities for establishing new, mutually beneficial business approaches – moving away from capital-intensive, short-term spending towards more predictable long-term risk-sharing contracts and managed service business models.

The future of care demands more rigorous clinical content management

Many of the problems healthcare providers face today stem from issues surrounding the convergence of clinical content from legacy implementations across the healthcare enterprise. As we have discussed, a phased approach offers a guide for utilizing a mature clinical archive as a means to support consolidation and the decommissioning of many legacy applications. It also focuses early on identifying key operational and clinical pain points to support long-term interoperability bottlenecks that should provide early wins in terms of ROI.

However, the long-term future value of a robust, integrated clinical content solution is even greater when viewed in the context of where healthcare is heading. Controlled access to well-defined clinical datasets is becoming increasingly important as healthcare moves into the era of precision medicine, supported by artificial intelligence and predictive analytics. Diagnosis, treatment planning, care management and longitudinal tracking of patient care all depend on bringing together administrative, operational and clinical content. Unless healthcare providers more actively tackle these clinical content management problems, breaking down departmental data silos and improving broader clinical access, they may find themselves left behind their peers in advancing to the next era of care delivery. For many, the journey should begin with a basic "ground truth": the implementation of a mature, structured clinical archive solution.

At Signify Research we are passionately curious about Healthcare Technology and we strive to deliver the most robust market data and insights, to help our customers make the right strategic decisions. We blend primary data collected from in-depth interviews with technology vendors and healthcare professionals, to provide a balanced and complete view of the market trends.

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